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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/731,385 | 12/06/2000 | Myeong-cheol Kim | SAM-164 | 8322 |
| 7590 | 07/23/2004 | | EXAMINER | |
| Mills & Onello LLP Eleven Beacon Street Boston, MA 02108 | | | NADAV, ORI | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2811 | |

DATE MAILED: 07/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 09/731,385 | KIM ET AL. |
| | Examiner | Art Unit |
| | ori nadav | 2811 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 06 July 2004.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-7 and 14-40 is/are pending in the application.
 4a) Of the above claim(s) 16-20 is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-7, 14, 15 and 21-40 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-3, 14-15, 23-24 and 29-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claimed limitations of a portion contacting the second conductive layer and on the surfaces of the conductive layer patterns, as recited in claim 31, are unclear as to which element or elements the portion contacts and what is meant by the phrase "on the surfaces".

The claimed limitation of conductive layer pattern, as recited in claims 2-3, 14-15, 23-24, 29-30, 33-34 and 39-40, is unclear as to which element applicant refers.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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1. Claims 1-7, 15, 21-28, 30-38 and 40, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (5,882,973) in view of Nguyen (6,472,261).

Regarding claims 1, 21 and 31, Gardner et al. teach in figure 7 and related text a semiconductor device comprising:

a plurality of conductive patterns 18a, 18b formed to be adjacent to one another by sequentially stacking and patterning a first conductive layer 18 on a particular underlying layer 10;

a first insulation layer (the small square under layer 28b) filling a gap between adjacent conductive patterns the first insulation layer being formed of a first insulating material (silicon oxide) and being formed laterally adjacent to and not underneath the conductive patterns,

a second insulation layer 28b having a spacer shape, the second insulation layer formed at the sides of each conductive pattern and over the first insulation layer; the second insulation layer being formed of a second insulating material (silicon nitride) different from the first insulating material, and

a second conductive layer 48 filling a contact hole which is self-aligned with respect to the second insulation layer between adjacent conductive patterns, the contact hole passing through the first insulation layer, the first insulation layer extending between adjacent conductive patterns and between the second conductive layer and the conductive patterns and having a single aligned planar top surface throughout the

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distance between at least one of the conductive patterns and the second conductive layer, and

third insulation layer (located between layer 28b and 18b) provided between the first insulation layer and the sides of each conductive layer pattern and between the second insulation layer and the side of the conductive layer pattern,

wherein the third insulation layer provided on the surface of the underlying layer except for a portion contacting the second conductive layer and on the surfaces of the conductive layer patterns.

Gardner et al. do not explicitly state that the contact between the plurality of conductive patterns 18a, 18b is a self-aligned contact formed by sequentially stacking and patterning a first conductive layer and a mask layer.

Nguyen teaches in figure 6 and related text a semiconductor device having a self-aligned contact, wherein the semiconductor device comprising a plurality of conductive patterns formed to be adjacent to one another by sequentially stacking and patterning a first conductive layer 14 and a mask layer 18, and a second conductive layer 42 filling a contact hole which is self-aligned with respect to the second insulation layer between adjacent conductive patterns, the contact hole passing through the first insulation layer.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the contact between the plurality of conductive patterns in Gardner et al.'s device to be a self-aligned contact by sequentially stacking and patterning a first conductive layer and a mask layer in order to improve the processing steps of making the device.

Regarding claims 2, 23 and 33, Gardner et al. teach in figure 7 a top of the first insulation layer is lower than the top of the first conductive layer 18a of each conductive layer pattern.

Regarding claims 3, 24 and 34, Gardner et al. do not teach in figure 7 the top of the first insulation layer is higher than the top of the first conductive layer. Nguyen teaches in figure 6 the top of the first insulation layer 22 is higher than the top of the first conductive layer of each conductive layer pattern 14. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the top of the first insulation layer to be higher than the top of the first conductive layer in Gardner et al.'s device in order to provide better protection to the gate electrode.

Regarding claims 4-7, 25-28 and 35-38, Gardner et al. teach in figure 7 an etching rate of the first insulation layer is larger than that of the second insulation layer, the dielectric constant of the first insulation layer is smaller than that of the second insulation layer, wherein the first insulation layer is formed of a silicon oxide layer and the second insulation layer is formed of a silicon nitride layer.

Regarding claims 15, 30 and 40, Gardner et al. teach in figure 7 the first conductive layer of each conductive layer pattern is a gate electrode, and the contact contacts the surface of a semiconductor substrate.

Regarding claims 22 and 32, Gardner et al. do not teach that the third and fourth insulation layers are formed at a thickness of 50-200 Å. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use third and fourth insulation layers at a thickness of 50-200 Å in Gardner et al.'s device, in order to provide adequate insulation to the device and because it is well within the skills of an artisan to optimize the performance of the device by forming the third and fourth insulation layers at the required thickness.

2. Claims 14, 29 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. and Nguyen, as applied to claims 1, 21 and 31 above, and further in view of Huang (5,899,722).

Gardner et al. and Nguyen teach substantially the entire claimed structure, as applied to claims 1, 21 and 31 above, except using the first conductive layer of each conductive layer pattern as a bit line, and the second conductive layer to connect a storage electrode of a semiconductor capacitor to a semiconductor substrate.

Huang teaches that a self aligned contact structure, similar to that disclosed by Chang et al., can be used in a DRAM. A DRAM comprises a first conductive layer being a bit line, and a second conductive layer serves to connect a storage electrode of a semiconductor capacitor to a semiconductor substrate. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Gardner et al. and Nguyen's device in a DRAM device in order to use the device in a specific application which requires a DRAM device. Note that a recitation of the intended use of

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the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Response to Arguments

Applicant's arguments with respect to claims 1-7, 14-15 and 21-40 have been considered but are moot in view of the new ground(s) of rejection.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is (571) 272-

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1660. The Examiner is in the Office generally between the hours of 7 AM to 4 PM

(Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**



O.N.
July 20, 2004

ORI NADAV
PATENT EXAMINER
TECHNOLOGY CENTER 2800